ARMY AIR FORCES
TECHNICAL ORDER No. 08-10-150

INSTRUCTION BOOK

FOR

OPERATION AND MAINTENANCE

OF

RADIO RECEIVER BC-1023-A

RESTRICTED

PUBLISHED BY AUTHORITY
OF
THE CHIEF SIGNAL OFFICER

FOR AIRPLANE TYPE_____

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APRIL 14, 1943

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R. & R.—15M—5-43

April 14, 1943

Destruction of
Abandoned Materiel in the Combat Zone

In case it should become necessary to prevent the capture of this equipment and when ordered to do so,

DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

Means:-

1. **Explosives, when provided.**
2. **Hammers, axes, sledges or whatever heavy object is readily available.**
3. **Burning by means of incendiaries such as gasoline, oil, paper or wood.**
4. **Grenades and shots from available arms.**
5. **Where possible, and when time permits, bury all debris or dispose of it in streams or other bodies of water.**

Procedure:-

1. **Obliterate all identifying marks. Destroy nameplates and circuit labels.**
2. **Demolish all panels, castings, switch- and instrument-boards.**
3. **Destroy all controls, switches, relays, connections and meters.**
4. **Rip out all wiring in electrical equipment. Smash gas, oil and water cooling systems in gas-engine generators, etc.**
5. **Smash every electrical or mechanical part whether rotating, moving or fixed.**
6. **Break up all operating instruments such as keys, phones, microphones, etc.**
7. **Destroy all classes of carrying cases, straps, containers, etc.**

UNSATISFACTORY REPORT

In the event of malfunctioning, unsatisfactory design, or unsatisfactory installation of any of the component units of this equipment, or if the material contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54 or a report in similar form shall be submitted in accordance with the provisions of Army Air Force Regulation No. 15-54, listing:

1. **Station and organization.**
2. **Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).**
3. **Date and nature of failure.**
4. **Airplane model and serial number.**
5. **Remedy used or proposed to prevent recurrence.**
6. **Handbook errors or inadequacies, if applicable.**

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FIGURE 1 — RADIO RECEIVER BC-1023-A, AND MOUNTING FT-161

INSTRUCTION BOOK
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of
RADIO RECEIVER BC-1023-A

Restricted

SECTION I

DESCRIPTION

1. GENERAL

a. Radio Receiver BC-1023-A is an ultra-high frequency radio receiver for aircraft. Its frequency range is from approximately 62 megacycles to approximately 80 megacycles and its purpose is to receive 75-megacycle marker beacon signals used in the Army instrument landing system, the cone of silence, and fan marker beacons of the Civil Aeronautics Administration, and other facilities employing modulated 75 megacycle transmissions. The output indication is visual in the form of an indicator lamp on the instrument panel. The indicator lamp flashes in accordance with signal pulses generated by the keyed marker transmitter, thereby identifying these transmitters.

b. The sequence of operation upon the received modulated signal is as follows:

(1) Pickup by the half wave antenna.

(2) Amplification at 75 megacycles by the first tube.

(3) Triode grid detection and a-f amplification by the second tube.

(4) Additional amplification and rectification of the audio signal by the third tube.

(5) Additional a-f amplification by the fourth tube.

(6) Rectification of the audio signal by the diode section of the third tube to produce the direct current for the operation of the relay which controls the lamp circuit.

2. COMPONENTS

Radio Receiver BC-1023-A consists of the following component parts:

Quantity	*Description*	*Dimensions*	*Weight (lbs.)*
1	Mounting FT-161	5½" x 5 13/16" x 1½"	0.5
1	Radio Receiver BC-1023-A	5⅝" x 5⅜" x 3 7/16"	2.65
1	Tube VT-288 (12SH7)	2⅝" x 1⅜" dia.	0.065
1	Tube VT-103 (6SQ7)	2⅝" x 1⅜" dia.	0.065
1	Tube VT-105 (6SC7)	2⅝" x 1⅜" dia.	0.065
1	Tube 6U6GT	3⅛" x 1⅜" dia.	0.068

The total weight of Radio Receiver BC-1023-A is 3.413 pounds.

3. PLUG PL-108

Plug PL-108, furnished by the airplane manufacturer, connects Radio Receiver BC-1023-A to the power supply and the indicator lamp.

4. POWER REQUIREMENTS

Radio Receiver BC-1023-A receives its power from the airplane battery power supply. The power requirement is 1.05 ampere at 13.75 volts. There is an intermittent current drain through the radio receiver to the indicator lamp.

SECTION II

EMPLOYMENT

5. INITIAL PROCEDURE

a. Insert the tubes in the proper sockets and make sure that the contact pins are in full engagement with the socket contacts.

b. Examine receiver carefully for mechanical defects.

c. Fasten Radio Receiver BC-1023-A to Mounting FT-161 by means of the snap slides. Wire them properly.

d. Connect the antenna plug and power supply plug to their proper sockets and tighten securely.

6. PREPARATION FOR USE

a. After the receiver has been installed and all connections have been made, turn on the radio receiver switch. Wait about 1 minute for the tubes in the receiver to warm up.

b. Apply a test signal to the receiver and check the tuning. Use Test Set I-76. (For a complete description of Test Set I-76 see the instruction book for that equipment.) Proceed as follows:

(1) Set the test oscillator on the ground about 10 to 20 feet from the side of the aircraft. Extend the test oscillator antenna to its full length and set parallel with the antenna. Turn the battery switch on and set the modulation for 3,000 cycles.

(2) Connect Test Indicator BE-67, a part of Test Set I-76, to the output of the receiver. To do this plug one end of the cord into the jack of the test indicator. Set the switch on the test indicator to the TUNE RECEIVER position, and the milliammeter will indicate the output current of the receiver. If no indication is obtained, check the oscillator and refer to the instructions describing the adjustment of this instrument.

(3) Use a screwdriver with a ⅛-inch blade for tuning the ANT and DET tuning capacitors. Tune for maximum response on the test indicator. Tune in this order: DET-ANT-DET. If the ANT adjustment is very far off, check from one position to the other a couple of times and then tune DET last. If the output exceeds 0.5 ma at the maximum response, decrease the length of the antenna on the test oscillator by collapsing the sections or place the test oscillator farther away. Rotation of the test oscillator will also accomplish the same result. There should be no moving object in the vicinity of the test oscillator or the radio receiver antenna while the tuning adjustment is in progress. Always make this tuning adjustment with the receiver chassis in its case.

c. Remove the test signal and check relay as follows:

(1) Hold the switch on Test Indicator BE-67 in the ADJUST RELAY position.

FIGURE 2 — RADIO RECEIVER BC-1023-A, FRONT VIEW

(2) Turn the control knob on the test indicator clockwise until the indicator light on the receiver goes on and then turn the knob back until the light goes off. The relay should close at 0.4 milliampere (—0+10%). Follow the procedure outlined in Paragraph 18 if the relay needs adjustment.

(3) After Test Indicator BE-67 has been disconnected, the receiver is ready for operation.

(4) Turn the test oscillator on. Observe if the indicator lamp on the instrument panel lights after the test indicator has been removed. This is a check to see if the jack circuit closes properly after the plug has been removed.

7. OPERATION

a. Radio Receiver BC-1023-A enables the pilot to determine when he is flying over a 75-megacycle marker beacon transmitter. This transmitter may be an Army instrument landing type such as Radio Transmitter BC-302, Marker Beacon Projector A-1 or Radio Transmitter BC-902. Along the airways the marker may be of the cone of silence or the fan marker beacon type. The receiver will respond to any 75-megacycle signal which is modulated at an audio rate.

b. The interval during which the marker beacon indicator lamp will indicate varies from a few seconds to as long as several minutes and depends upon the type of marker and the altitude and speed of the airplane. Cone of silence markers utilize non-directional antenna arrays which cause equal indications for any direction of flight. When the speed of the airplane is 150 miles per hour, at 10,000 feet altitude, indications over cone of silence marker last about 1 minute.

c. To eliminate false or confusing signals, the receiver is designed so that stray radiations, natural or man-made static, ignition interference or vibrations have a minimum effect.

d. Actual operation of the receiving equipment requires only that the receiver switch be turned on. No other adjustments are required while the equipment is in use.

8. PRECAUTIONS DURING OPERATION

a. Observe the following precautions during the operation of this equipment in order to avoid faulty use and misinterpretation of results:

(1) Have the radio receiver switch in the ON position.

(2) When passing over a marker the indication should be steady or flash regularly, according to the keying of the transmitter. Cone of silence markers and some Army instrument landing markers are not keyed. Fan type markers and Civil Aeronautics Administration instrument landing markers are identified by keying. However, Radio Receiver BC-1023-A may not follow the keying of the 100 watt fan marker transmitters when the airplane is passing through the strongest part of the beam at low altitudes.

b. Flickering of the indicator lamp may be caused by a defect in the antenna installation, microphonic tubes, or ignition interference.

NOTE: *The receiver will perform best when the 6SC7 tube used is of RCA manufacture. For this reason it is recommended that when replacement of that tube is necessary that an RCA tube be used; if none is available and another make of tube is used the sensitivity of the receiver must be checked.*

SECTION III

FUNCTIONING OF PARTS

9. RADIO RECEIVER BC-1023-A

a. (1) Radio Receiver BC-1023-A is a four tube, tuned, radio frequency radio receiver. Tube VT-288 (12SH7) functions as a radio frequency amplifier. Tube VT-103 (6SQ7) functions as an audio frequency amplifier and rectifier, which supplies the relay current, while Tube VT-105 (6SC7) functions as a grid circuit detector and an audio frequency amplifier. Tube 6U6GT functions as an audio frequency amplifier.

(2) Refer to the schematic diagram, Figure 3. The high frequency signal (75 megacycles) picked up by the antenna is fed to the primary of the input radio frequency transformer 5* through a concentric transmission line. The secondary of this transformer is tuned. The primary of this transformer is a tap approximately one-half turn above chassis ground. The high frequency voltage induced in the secondary of the r-f transformer is impressed on the control grid of Tube VT-288 (12SH7) by means of capacitor 12 and grid resistor 23. The high frequency variations of the plate current of Tube VT-288 (12SH7) caused by the signal voltage impressed on the control grid produces a radio frequency voltage across r-f choke 7-2 which is impressed on the triode grid of Tube VT-105 (6SC7) by means of coupling capacitors 13 and 11-1 and grid resistor 20-2. The main advantage of tuned circuit 6 and 10 is that it gives the receiver more selectivity. The radio frequency signal is rectified by the triode grid of Tube VT-105 (6SC7). The audio frequency voltage produced across resistor 21 is coupled back to the other grid of Tube VT-105 (6SC7) by means of capacitor 14-1 and resistor 20-1. R-F choke 7-3 and capacitor 15 filter the r-f voltage from the audio circuits. The audio frequency variations of plate current flowing through resistor 22-1 produce an audio frequency voltage which is impressed on the grid of tube 6SQ7 by means of coupling capacitor 14-2 and grid resistor 18-1. The audio frequency voltage produced across plate resistor 22-2 is impressed on the grid of the audio frequency amplifier tube 6U6GT by means of coupling capacitor (14-3) and grid resistor 18-2. The audio frequency voltage produced across audio choke 8 is impressed on the diode plate of Tube VT-103 (6SQ7) by means of capacitor 17 and the coil of relay 30 which functions as the diode load. The rectified audio frequency current flowing through the relay coil operates the relay, thus closing the contacts of the relay and completing the circuit of the radio receiver indicator lamp.

* Numbers refer to reference numbers of parts on the schematic diagram, Figure 3.

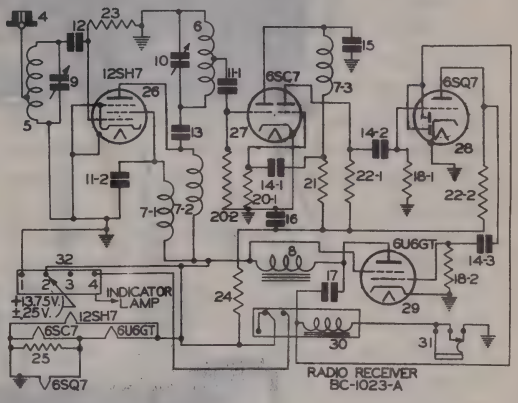


FIGURE 3 — RADIO RECEIVER BC-1023-A, SCHEMATIC CIRCUIT DIAGRAM

4 ANTENNA JACK

5 ANTENNA INPUT TRANSFORMER

6 DETECTOR TUNING COIL

7 R-F CHOKE (3 REQUIRED)

8 AUDIO CHOKE

9 ANTENNA TUNING CAPACITOR 18 MMF.

10 DETECTOR TUNING CAPACITOR 18 MMF.

11 CAPACITOR — CERAMIC, 250 MMF., 500 V. (2 REQUIRED)

12 CAPACITOR — CERAMIC, 8 MMF.

13 CAPACITOR — CERAMIC, 100 MMF.

14 CAPACITOR — PAPER, .01 MFD. (3 REQUIRED)

15 CAPACITOR — CERAMIC, 20 MMF.

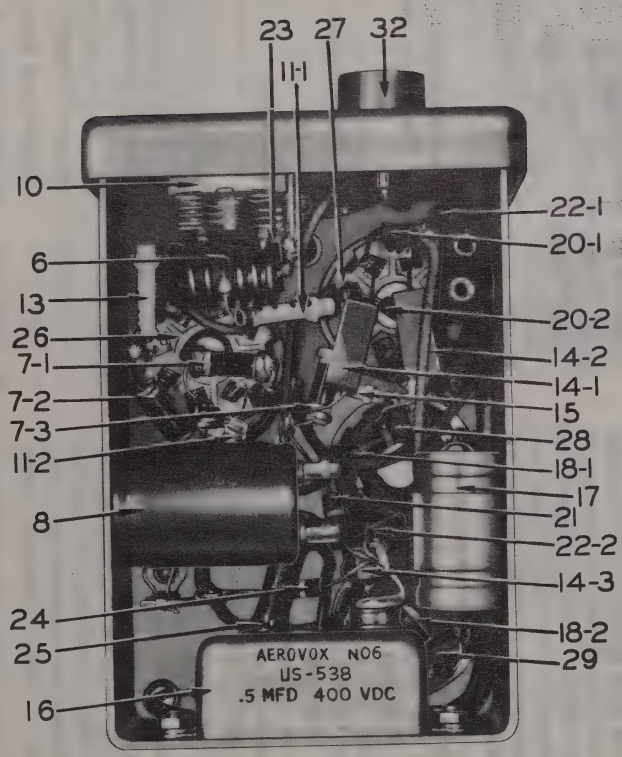


FIGURE 4 — RADIO RECEIVER BC-1023-A, BOTTOM VIEW

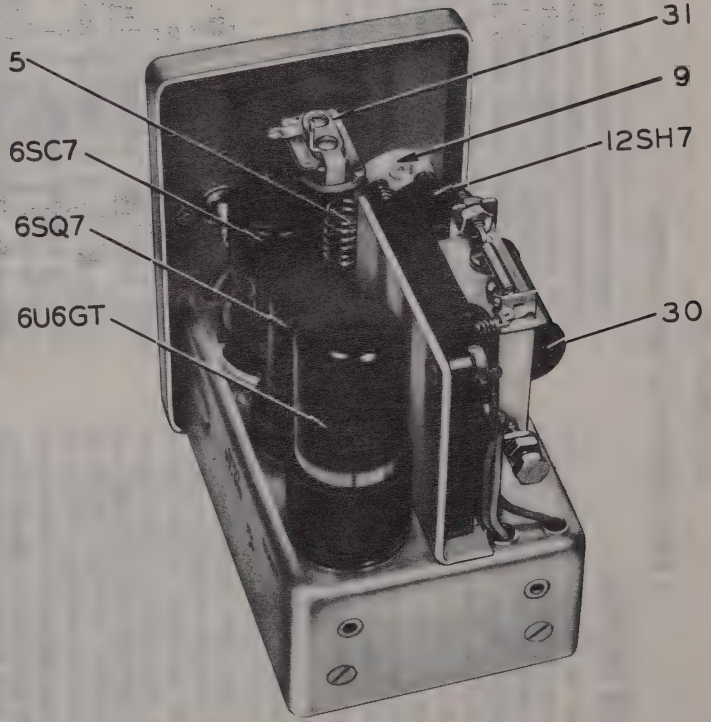


FIGURE 5 — RADIO RECEIVER BC-1023-A, TOP VIEW

16 CAPACITOR — PAPER, 0.5 MFD., 400 V.
17 CAPACITOR — PAPER, .034 MFD., 600 V.
18 RESISTOR — 10 MEGOHM, ¼ WATT
(2 REQUIRED)
20 RESISTOR —3.3 MEGOHM, ¼ WATT
(2 REQUIRED)
21 RESISTOR — 470,000 OHM, ¼ WATT
22 RESISTOR — 1 MEGOHM, ¼ WATT
(2 REQUIRED)
23 RESISTOR — 10,000 OHM, ¼ WATT
24 RESISTOR — 100,000 OHM, ¼ WATT
25 RESISTOR — 39 OHM 2 WATT
26 TUBE SOCKET
27 TUBE SOCKET
28 TUBE SOCKET
29 TUBE SOCKET
30 RELAY
31 RELAY JACK
32 SOCKET SO-88

(3) At the high radio frequencies used in this receiver it is necessary to regard the wiring of the radio frequency circuits as an important part of the circuit constants. Whenever parts are replaced, another receiver or the photographs in the instruction book must be used as reference, and the exact lengths and positions of leads duplicated.

b. (1) Resistor 24 and capacitor 16 act as a filter circuit in the plate voltage supply to Tube VT - 103 (6SQ7) and Tube VT - 105 (6SC7). This filter serves to prevent "hash" or "ripple" which might be caused in the voltage supply from the operation of the relay. The characteristics of filter 24 and 16 are such as to render negligible the effect of 0.2 volts of audio-ripple in the band 40 cps to 3,000 cps, in the voltage supply.

(2) The screen grid potential of Tube VT-288 (12SH7) is supplied through r-f choke 7-1. Capacitor 11-2 functions as a by-pass for the screen grid circuit. The screen grid of the audio frequency amplifier tube 6U6GT is connected direct to the positive side of the voltage supply.

c. Capacitors 12, 13 and 11-1 are of the temperature compensating ceramic type and correct for changes in temperature.

d. Tube VT-288 (12SH7) has a 12.6 volt heater and is connected directly across the voltage supply line. Tube VT-105 (6SC7), Tube VT-103 (6SQ7) and Tube 6U6GT have 6.3 volt heaters. Tube VT-105 (6SC7), Tube VT-103 (6SQ7) and resistor 25 are all connected in parallel; and in turn are connected in series with tube 6U6GT. Resistor 25 balances the heater current through tube 6U6GT so that the voltage distribution is correct on all of the 6.3 volt heater tubes.

e. Relay BK-35, reference 30 on the schematic diagram, is shown in Figure 7. The closing current is 0.4 ma. Release occurs when the current drops to 0.2 ma. Always make the adjustment carefully according to instructions given in Paragraph 18. The armature travel is determined by screws S_1 and S_2, which should be adjusted very carefully. The tension on the armature which pivots about point 0 is regulated by a third set screw, S_3, acting upon spring Sp. Terminals A_1 and A_2 are for the armature coil C of the relay. The circuit to the radio receiver indicator lamp is completed through the armature and the contact connected with terminal B_1. Terminal B_3 is not used.

f. Make tuning adjustments on the receiver by varying capacitors 9 and 10. These are marked ANT and DET respectively on the front panel. The positions of these capacitors are shown in Figure 2.

SECTION IV

MAINTENANCE

10. GENERAL

Radio Receiver BC-1023-A, an ultra-high frequency receiver, imposes greater restrictions on maintenance and requires more particular servicing than ordinary tuned radio frequency receivers. However, since the receiver is relatively simple and insensitive, the precautions to be observed are few, though stringent. The maintenance of the radio frequency portion of this receiver demands care. At ultra-high frequencies the length of connecting leads and the placement of parts such as coils and capacitors are extremely important. Take care in replacing parts or leads. Carefully follow photographs in Figures 4 and 5 or refer to a standard receiver. The circuits connected to Tube VT-288 (12SH7) are the only critical ones in these respects.

NOTE: *Because of the series-parallel arrangement of the filament circuit, the receiver power must always be turned* OFF *before removing Tube VT-103 or Tube VT-105. Otherwise damage will result from excessive voltage.*

11. FLIGHT INSPECTION

Inspect Radio Receiver BC-1023-A before every radio flight (inspection may be omitted on short local flights in fair weather) according to the following routine:

a. Examine the receiver. Note whether the tubes are correctly in place, the antenna and power plugs are firmly seated, the chassis case is properly fastened to chassis, and the entire receiver is secured to mounting with safety wires.

b. Refer to preliminary instructions for Marker Beacon Receiving Equipment RC-193-AZ for information on antenna and transmission line checks.

c. Turn the compass switch to the ON position, or turn the radio receiver switch on if the plane does not have a compass.

d. Wait about 1 minute for the tubes in the receiver to heat to normal temperature.

e. Use Test Set I-76 and test and align receiver as directed in SECTION II, Paragraph 6.

12. SERVICE INSPECTION

a. Check tubes as indicated in Paragraph 17.

b. Check the relay closing and release currents according to the procedure outlined in SECTION II, Paragraph 6. Make necessary relay adjustments by following the instructions of Paragraph 18.

c. Align the receiver as indicated in Paragraph 6 whenever tubes are replaced or the installation of the antenna structure, including the transmission line, is modified or repaired. Always install receiver chassis in its case when the final alignment of the receiver circuits is made.

d. A flight test should be made over Army instrument landing markers to make sure that the receiver is functioning properly when receiving signals from these transmitters.

13. VACUUM TUBES

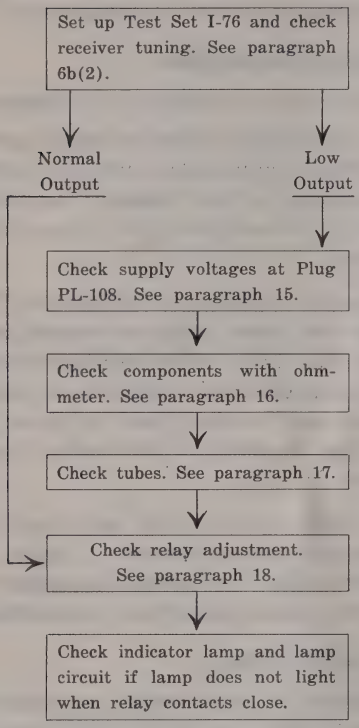
The functions and the operating characteristics of the vacuum tubes required for Radio Receiver BC-1023-A appear in the table below.

Tube Function	*VT-288 (12SH7) Pentode R.F. Amp.*	*VT-105 (6SC7) First Audio Amp. Triode Det.*	*VT-103 (6SQ7) Second Audio Amp. Diode Rect.*	*6U6GT Third Audio Amp.*
Heater volts	12.6	6.3	6.3	6.3
Heater amp	.15	.3	.3	.75
Screen volts	13.75	——	——	13.75
Plate volts	13.75	11	11.5	11.5
Grid volts	0	0	0	0
Plate ma	.64	.003	.003	7.0
Screen ma	.28	——	——	.73

14. TROUBLE LOCATION AND REMEDY CHART

SERVICE ROUTINE

Receiver Not Satisfactory in Flight


Set up Test Set I-76 and check receiver tuning. See paragraph 6b(2).
Normal Output
Low Output
Check supply voltages at Plug PL-108. See paragraph 15.
Check components with ohmmeter. See paragraph 16.
Check tubes. See paragraph 17.
Check relay adjustment. See paragraph 18.
Check indicator lamp and lamp circuit if lamp does not light when relay contacts close.

15. SUPPLY VOLTAGES

Plug PL-108 permits a check on the voltage supply which is obtained from the radio compass. When the radio compass or radio receiver switch is in operation and Plug PL-108 is removed from the radio receiver, the voltage measurements should be as follows:

Terminals		*Volts*
Neg.	Pos.	
1	2	13.7

This is a typical value and depends upon the battery voltage. The correctness of voltage distribution in the receiver in operation is assured by the determination of the proper values of the components, tubes and supply voltage.

16. CONTINUITY TESTS ON RADIO RECEIVER BC-1023-A

a. Remove Plug PL-108 and the vacuum tubes from their sockets when making continuity tests.

b. Check resistors at their terminals since none are shunted by other components excepting capacitors. Failure to obtain values as designated on the circuit label indicates a defect in the resistor or breakdown of adjacent capacitor. Check adjacent capacitors immediately for short circuits in the event of failure to obtain correct ohmmeter readings for the resistors.

c. (1) Capacitors should all have resistance values on the order of 10,000 megohms at room temperature, although values as low as 1,000 megohms are satisfactory for serice. Measurement across the terminals of all fixed capacitors with the exception of 11-1 and 12 should indicate resistance values beyond the upper limit of the ohmmeter on its highest range.

(2) A small kick of the ohmmeter needle when first connecting to the capacitor terminals is due to the surge of charging current. The steady value is the indication of resistance. The kick is an indication of the size of the capacitor and will be observed only with values on the order of .01 mf. or larger and indicates that the capacitor is not open circuited.

(3) Capacitors 11-1 and 12 will measure 3.3 megohms and 10,000 ohms respectively when measured across their terminals and shunted by the resistors.

d. Examine r-f input transformer 5 and inductor 6 to insure that the soldered connections are satisfactory and that the spacing between turns is uniform. R-F chokes 7-1, 7-2 and 7-3 may be checked by direct measurement across terminals. The resistance of these chokes is about 5 ohms. See Figure 4.

e. Relay continuity tests comprise resistance measurement of coil C. It has a nominal value of approximately 13,000 ohms and may be measured at terminals A_1 and A_2 as shown

in Figure 7. Measure the contact resistance between terminals B_1 and B_2. This will be negligible when the contacts are closed by light pressure on the armature.

f. Audio frequency choke 8-1 has a d-c resistance of approximately 280 ohms.

17. TUBE TESTING

a. Check the tubes on the best available type of tube tester, preferably an equipment capable of determining the characteristics listed under paragraph 9. Observe gas current whenever possible. The final test of tube condition is performance in the receiver, determined as indicated in paragraphs 20 and 21. Tubes may be tested roughly on the Model 685 tube checker according to Paragraph 3, SECTION III, of the instruction book for Test Set I-56-A.

NOTE: *When testing Tube VT-105 (6SC7) and Tube VT-103 (6SQ7) use adapter "B" in the octal socket of Model 685 tube checker.*

The following chart gives test data for the tubes used in the radio receiver:

Tube	*Filament Selector*	*Tube Selector*	*IN Position*
VT-288 (12SH7), Pentode	8	42	CFG
6U6GT, Pentode	6	44	BCD
*VT-103 (6SQ7), Triode Sec.	6	41	BC
*VT-103 (6SQ7), Diode Sec.	6 6	0 0	C C
*VT-105 (6SC7), Double Triode	6	41	BC & DF

* Use Adapter "B".

18. RELAY BK-35 ADJUSTMENT

a. Check Relay BK-35 by the following procedure: Turn the radio receiver ON and wait for tubes to heat. Connect Test Indicator BE-67 to the receiver by means of Cords CD-316 or CD-316-A. Hold the switch on the panel of the test indicator in the momentary contact or ADJUST RELAY position while the control knob is turned to vary the relay current. The current required to close the relay should be from .4 milliampere to .44 milliampere. As the current is reduced, the relay should release at 0.2 milliampere to 0.22 milliampere. If the indicator lamp fails to light, remove the receiver from case, and check the lamp circuit and the relay contacts. Clean latter if necessary.

b. Readjust the relay as follows:

(1) Refer to Figure 7.

(2) Insert a sheet of ordinary letter paper between the armature and relay coil pole pieces. Release screw S_1 and exert a slight pressure on the armature directy above the pole piece. Turn screw S_1 until contact is

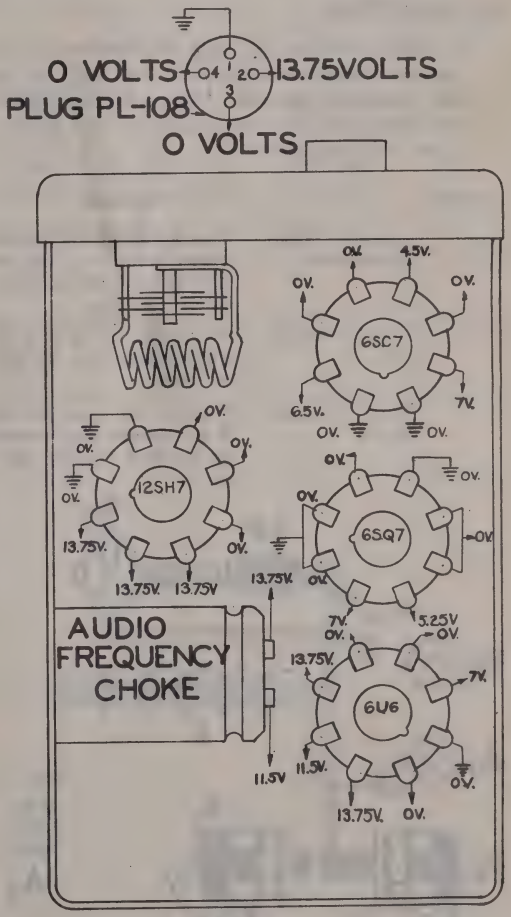


FIGURE 6 — TERMINAL-TO-GROUND VOLTAGES (NORMAL FOR RADIO RECEIVER BC-1023-A —BOTTOM VIEW OF CHASSIS

just made and indicator light goes on. Lock screw S_1 in place, compensating for effect of lash in threads. Exert very light pressure against the armature. The air gap should be 2 to 4 mils. Adjust the tension of the armature spring Sp by means of screw S_3 until release occurs at 0.2 to 0.22 milliampere of relay current. Lock screw S_3. Now adjust screw S_2 so that the relay closing current is 0.4 to 0.44 milliampere. It is important that the difference between closing and releasing be not less than 0.2 milliamperes for best performing service.

19. INDUCTORS

a. Radio Receiver BC-1023-A uses five r-f inductors, designated 5, 6, 7-1, 7-2, and 7-3 on the schematic diagram, Figure 3. The following table indicates the functions and dimensions of these coils:

Inductor	*Use*	*Description*
5	Antenna Input Transformer	7 turns No. 14 B & S tinned copper wire. Ant. Tap ½ turn above chassis ground. ⅜" ID; 1" long.
6	Detector Tuning Coil	5½ turns No. 14 B & S tinned copper wire. ⅜" ID; ⅝" long.
7	Radio Frequency Choke	Winding 1 3/32" long, No. 40 B & S enamel close wound on 7/32" diam. Ceramic tube.

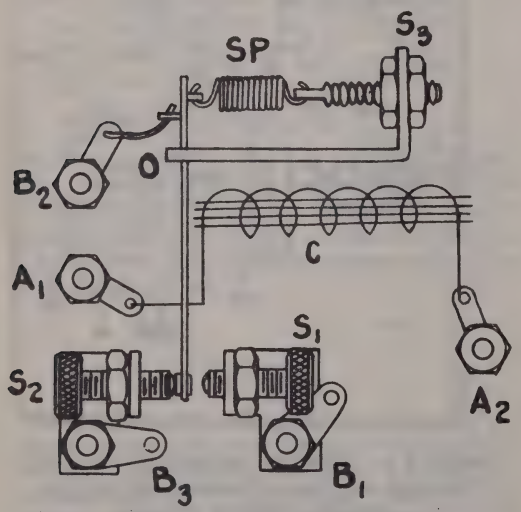


FIGURE 7 — RELAY BK-35, FUNCTIONAL DIAGRAM

b. The a-f inductor employed in Radio Receiver BC-1023-A is designated "8" on the schematic diagram. This inductor is a plate choke for tube 6U6GT. The manufacturer's rating of this inductor is 4.5 henries at 60 cycles with 5 ma. d-c flowing through it.

20. RECEIVER CHARACTERISTICS MEASUREMENTS

a. *Sensitivity*

Measure the sensitivity of the receiver by applying a 75 megacycle signal through a 75-ohm dummy antenna load from a signal generator, such as a Ferris Microvolter Model 18-C. The dummy antenna may be an IRC type BT-½, 75-ohm resistor. Connect the resistor by the shortest length lead to ANT jack (25), preferably by means of a Jones type 101-D plug. Modulate the signal generator by a suitable external source, according to the instructions applicable to the signal generator employed. (A Hewlett Packard Model 205A Audio Signal Generator has been found satisfactory.) A 30% modulated signal at 1,000 cps is required for the sensitivity measurement. The normal sensitivity of Radio Receiver BC-1023-A varies between 1,500 and 2,500 microvolts input at 1,000 cps (30% modulation). This is the test input required to produce a 0.4 milliampere standard output from the receiver. Check by increasing the input to see that output on the order of 0.5 to 0.6 milliampere can be obtained. If a 0.2 volt audio frequency (40 cycles to 3,000 cycles) is applied in series with the voltage supply, the relay current should not be greater than 0.1 ma. and will normally be about 0.05 milliampere.

b. *Selectivity Measurement*

(1) Tune the receiver accurately to resonance at 75 megacycles, using 30% modulation at 1,000 cps. Adjust the signal input, employing a 75-ohm dummy antenna, to the level required for an output of 0.4 milliampere. This value will indicate normal receiver sensitivity.

(2) Set the signal generator frequency at about 70 megacycles and increase the input level two-fold.

(3) Increase frequency slowly until the receiver output is again 0.4 milliampere. Record the frequency at this point.

(4) Continue to increase the frequency beyond resonance until the receiver output falls to the standard value of 0.4 milliampere. Record the frequency at this point.

(5) The difference between values recorded in (3) and (4) is the bandwidth at two-fold (6 db) input.

(6) Repeat the above procedure but increase the signal level 10-fold in step (2). The bandwidth now obtained is for a 10-fold (20 db) increase in signal level.

(7) The measured values of bandwidth should be within 30 per cent of the following values and will normally be less for receivers of higher sensitivity because of variation in the regenerative effects of the amplifier tube, Tube VT-288 (12SH7).

Input	*Bandwidth*
2 X value at resonance (6 db)....	1.00 megacycles
10 X value at resonance (20 db)..	4.0 megacycles

21. INTERSTAGE MEASUREMENTS

Audio frequency measurements are given in the following table which gives the point of application of the test voltage and the nature and value of the signal required to produce a receiver output current of 0.4 milliampere. The test voltage is given with respect to chassis. Use shielded leads and an isolation condenser of 0.1 mf.

Point of Application	*Nature of Signal*	*Volts Required for 0.4 ma*
1st Grid of Tube VT-105 (6SC7)	1000 cps	.001
2nd Grid of Tube VT-105 (6SC7)	1000 cps	.0035
Grid of Tube VT-103 (6SQ7)	1000 cps	.045
Grid of Tube 6U6GT	1000 cps	.42

SECTION V

APPENDIX

22. TABLE OF REPLACEABLE PARTS FOR RADIO RECEIVER BC-1023-A

Reference No.	*Stock No.*	*Name of Part*	*Description*	*Function*	*Drawing No.*	*Manufacturer**
4		Cable Connector	H. B. Jones No. 101-D Special, single conductor	Antenna	US-520	J
5		Coil	Majestic Special	Antenna tuning	US-818	M
6		Coil	Majestic Special	Detector tuning	US-819	M
7		R-F Choke	Majestic Special Ref. No. 7-1 Ref. No. 7-2 Ref. No. 7-3	 12SH7 Screen choke 12SH7 Plate choke 6SC7 Plate choke	US-604	M
8		A-F Choke	Standard Transformer No. 275C11- 4.5 Henries	6U6GT Plate choke	US-833	ST
9		Capacitor	American Steel Pkg. variable, 18 MMF spec.	Antenna tuning	US-532	AM
10		Capacitor	American Steel Pkg. variable, 18 MMF	Det tuning	US-533	AM
11		Capacitor	Centralab type 813 Ceramic Temp. — .0007 ±15% coeff. 500 V.D.C. 250 mmf ±20% Ref. 11-1 Ref. 11-2	 Det grid coupling R-F screen by-pass	US-807	C
12		Capacitor	Centralab type 813 ceramic temp. coeff.—.0007 ±15% 8 mmf ±20% 500 V.D.C.	R-E grid coupling	US-839	C
13		Capacitor	Centralab type 813 ceramic temp. coeff.—.0007 ±15% 100 mmf ±20% 500 V.D.C.	R-F plate coupling	US-805	C
14		Capacitor	Dumont paper, Type P-3 300 V.D.C. .01 mf ±20% Ref. No. 14-1 Ref. No. 14-2 Ref. No. 14-3	 First audio coupling Second audio coupling Third audio coupling	US-808	D
15		Capacitor	Centralab type 813 ceramic temp. coeff.—.0007 ±15% 20 mmf ±20% 500 V.D.C.	Tube VT-105 plate by-pass	US-806	C

* See Paragraph 23, Index to Manufacturers.

22. TABLE OF REPLACEABLE PARTS FOR RADIO RECEIVER BC-1023-A — Continued

Reference No.	*Stock No.*	*Name of Part*	*Description*	*Function*	*Drawing No.*	*Manufacturer**
16		Capacitor	Aerovox paper type No. 430, 400 V.D.C. .5 mf −0% +30%	Plate supply by-pass	US-538	A
17		Capacitor	Aerovox paper type No. 600, 600 V.D.C. .034 mf ±15%	Third audio coupling	US-539	A
18		Resistor	Speer carbon, ¼ watt, insulated 10 megohm ±20% Ref. No. 18-1 Ref. No. 18-2	 Tube VT-103 grid 6AGGT grid	US-812	S
20		Resistor	Speer carbon, ¼ watt, insulated 3.3 megohm ±20% Ref. No. 20-1 Ref. No. 20-2	 First audio grid Det. grid	US-810	S
21		Resistor	Speer carbon, ¼ watt, insulated 470,000 ohms ±20%	Det. plate	US-832	S
22		Resistor	Speer carbon, ¼ watt, 1 megohm ±20% insulated Ref. No. 22-1 Ref. No. 22-2	 First audio plate Second audio plate	US-575	S
23		Resistor	Speer carbon, ¼ watt, insulated 10,000 ohms ±20%	12SN7 grid	US-809	S
24		Resistor	Speer carbon, ¼ watt, insulated 100,000 ohms ±20%	Plate supply filter	US-814	S
25		Resistor	Lectrohms, wirewound, 2 watt, 39 ohms ±5%	Heater circuit voltage equalizer	US-815	L
26		Socket	National Fabricated Products Ceramic SSSM, with mounting ring	For Tube VT-288 (12SH7)	US-514	N
27		Socket	National Fabricated Products Ceramic SSSM, with mounting ring	For Tube VT-105 (6SC7)	US-514	N
28		Socket	National Fabricated Products Mycanol S8TM, with mounting ring	For Tube VT-103 (6SQ7)	US-515	N
29		Socket	National Fabricated Products Mycanol S8TM, with mounting ring	For Tube 6U6GT	US-515	N
30		Relay BK-35	G M Laboratories special	Indicator lamp circuit	US-518	GM

* See Paragraph 23, Index to Manufacturers.

22. TABLE OF REPLACEABLE PARTS FOR RADIO RECEIVER BC-1023-A — Continued

Reference No.	*Stock No.*	*Name of Part*	*Description*	*Function*	*Drawing No.*	*Manufacturer**
31		Phone jack	Chicago Telephone Supply Co. circuit closing J-306 type, with nut and insulating washers	Relay test circuit	US-513	T
32	2Z8788	Socket SO-88	Four prong cable connector socket	For Plug PL-108	US-512	P
33		Jack cover	Majestic special	Relay jack cover	US-509	M
34	2C4357 M./L1	Slide fastener latch	Majestic US-605	Snap slide for Mounting FT-161	SC-D-2011-F(1)	KA
35		Slide fastener rivet	Majestic US-060	Snap slide for Mounting FT-161	SC-D-2011-F(2)	M
36	2C4357 M.1/W1	Slide fastener spring washers	Majestic US-268	Snap slide for Mounting FT-161	SC-D-2011-F(6)	M
37		Circuit lapel	Majestic special		US-590	M
38	2C4357 M.1/C2	Casing assembly	Majestic special	For receiver chassis	US-507	M
39	2C4357 M.1/W2	Washer	Majestic No. 607	Snap slide for Mounting FT-161	SC-D-2011-F(8)	M

* See Paragraph 23, Index to Manufacturers.

23. INDEX TO MANUFACTURERS

Code	*Name*	*Address*
M	Majestic Radio & Television Corp.	2600 W. 50th Street, Chicago, Illinois
ST	Standard Transformer Corporation	1500 N. Halsted Street, Chicago, Illinois
AM	American Steel Package	Defiance, Ohio
C	Centralab Company	Milwaukee, Wisconsin
A	Aerovox Corporation	New Bedford, Massachusetts
S	Speer Resistor Company	St. Mary's, Pennsylvania
GM	G. M. Laboratories	4314 N. Knox Avenue, Chicago, Illinois
J	H. B. Jones Co.	2300 W. Wabansia Avenue, Chicago, Illinois
K	Kellogg Switchboard & Supply Company	6550 S. Cicero Avenue, Chicago, Illinois
KA	Karas Manufacturing Company	4040 N. Rockwell Street, Chicago, Illinois
D	Dumont Electric	514 Broadway, New York, N. Y.
L	Lectrohm, Inc.	5133 W. 25th Place, Cicero, Illinois
T	Chicago Telephone Supply Company	Elkhart, Indiana
N	National Fabricated Products, Inc.	2650 West Beldon, Chicago, Illinois
P	Precision Specialties Co.	2345 W. Washington Blvd., Los Angeles, California

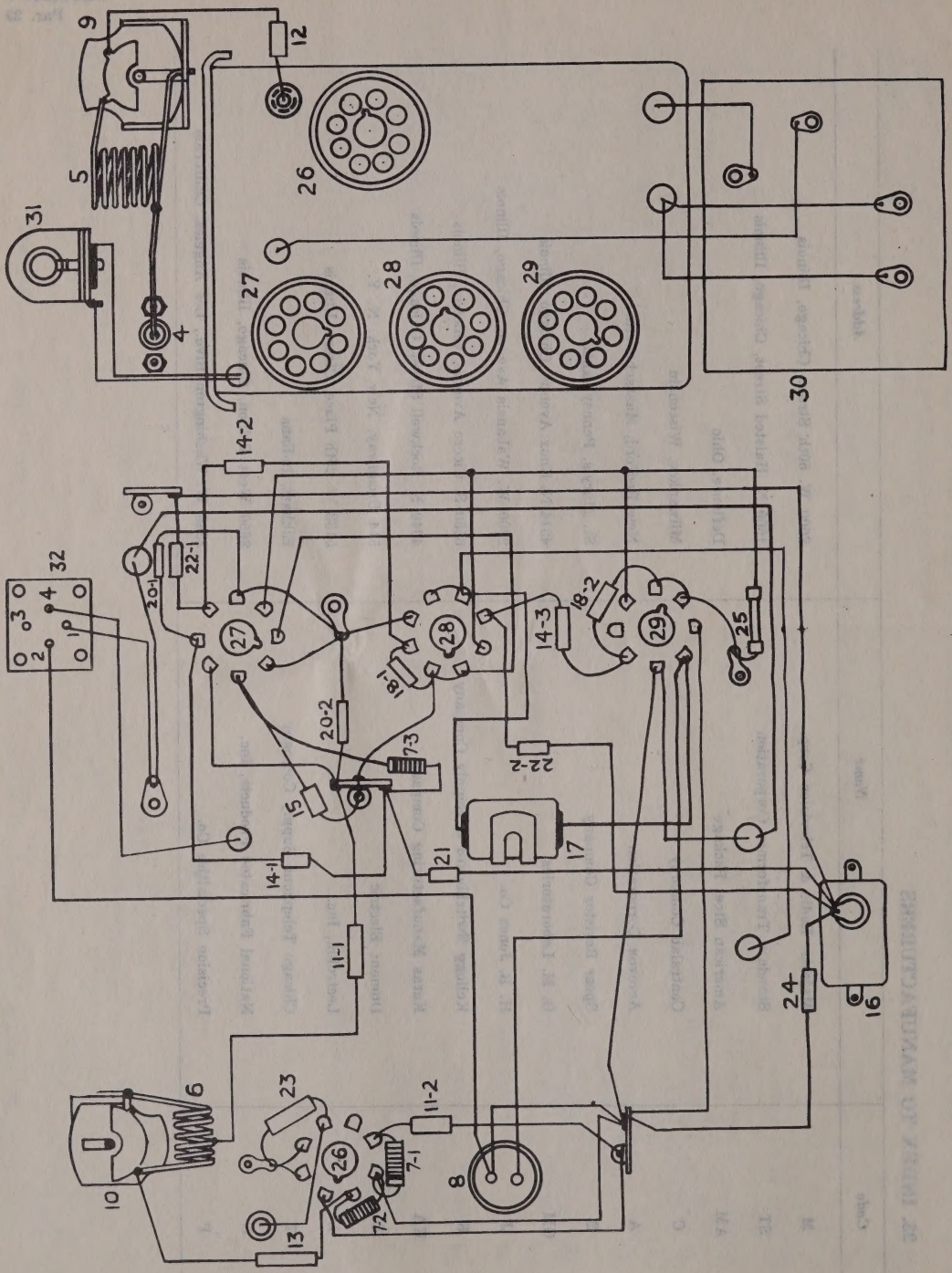


FIGURE 8 — RADIO RECEIVER BC-1023-A, PRACTICAL WIRING DIAGRAM

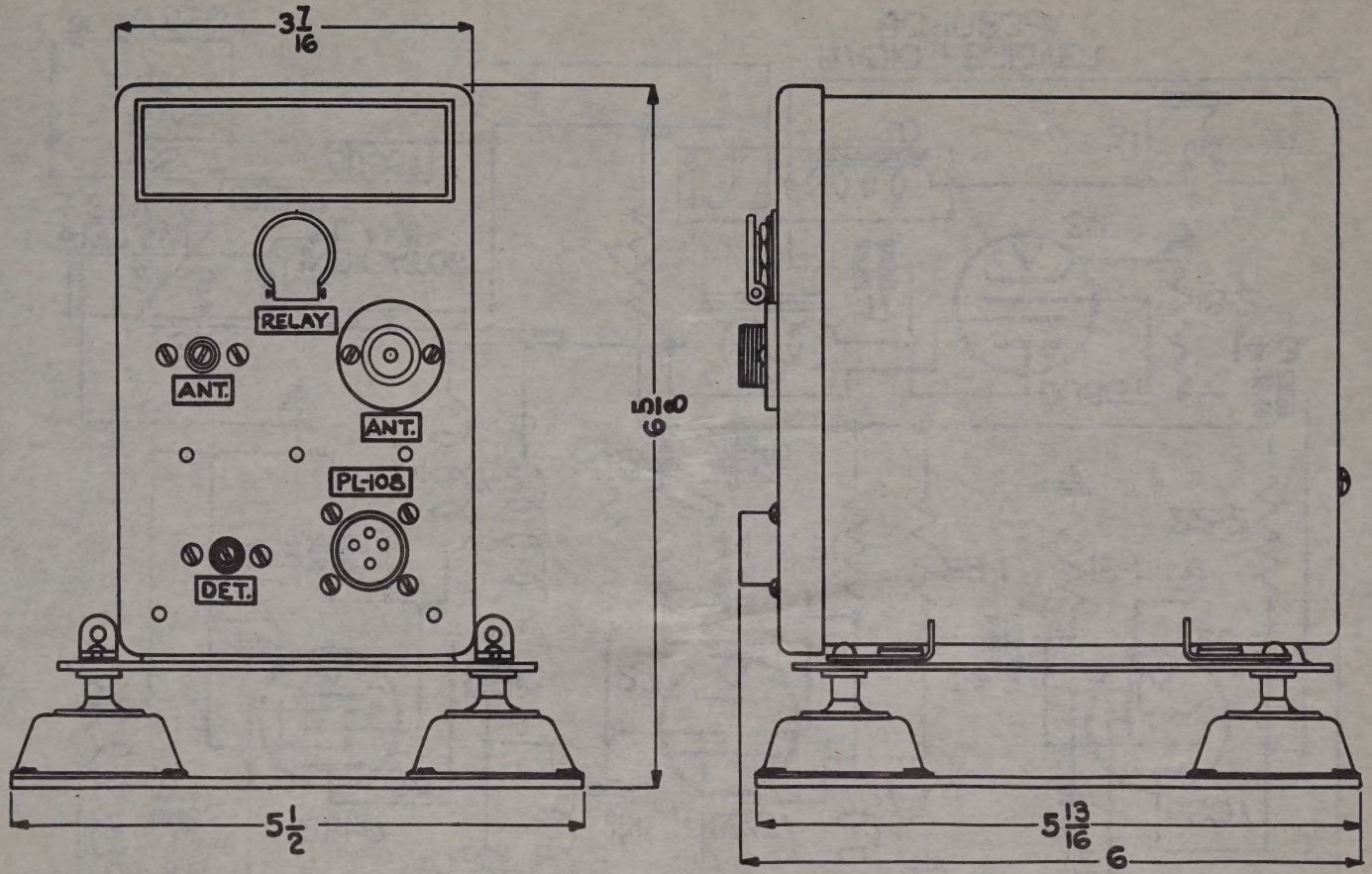


FIGURE 9 — RADIO RECEIVER BC-1023-A, OUTLINE DIMENSIONAL SKETCH

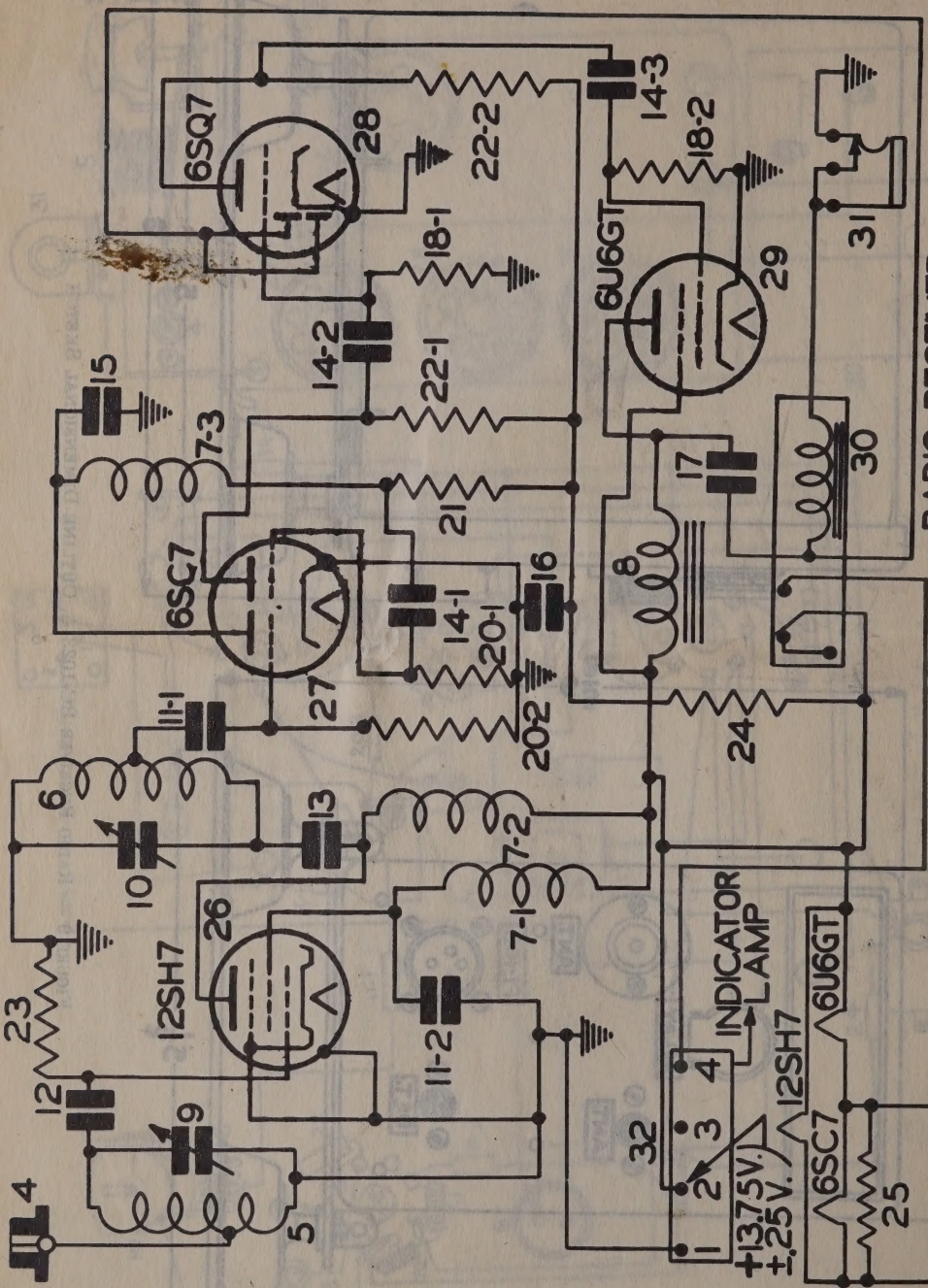


FIGURE 10 — RADIO RECEIVER BC-1023-A, SCHEMATIC CIRCUIT DIAGRAM